Appendix J

FY 1999 and FY 2000 Field Activities

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FY 1999 and FY 2000 Field Activities

J-1.1 INTRODUCTION

The Organic-Moderated Reactor Experiment (OMRE) reactor operated from about 1957 to 1963. During that time, the facility released at least 1.1 million gallons of radioactively and organically contaminated water to the OMRE Leach Pond (Sehlke 1993). Although decontamination and dismantlement (D&D) and several characterization events have occurred at OMRE since 1963, this appendix will detail only the most recent characterization activities (in 1999 and 2000). These activities were undertaken to fill data gaps that became evident during or after the initial Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) characterization activities in 1997. The 1997 and other previous sampling results are discussed in Section 11of the main remedial investigation/feasibility study (RI/FS), but the 1997 activities and results are also briefly discussed in the following paragraphs to lead into the reason for the 1999 and 2000 activities.

The 1997 characterization project was undertaken to begin determining the nature and extent of contamination in the surface soil and groundwater associated with liquid releases to the OMRE Leach Pond and a related ditch. The following activities were included in the 1997 Characterization Project:

- Collecting soil samples for laboratory analysis to assess radionuclide-contaminated surface soil above basalt bedrock
- Conducting a passive soil gas test to assess whether organic vapor was present in the OMRE Leach Pond subsurface
- Collecting groundwater samples from several area wells for radionuclide and organic compound analyses to assess whether contamination was present.

The limited sampling in 1997 of the small ditch related to the OMRE Leach Pond led to the discovery of stained soil of unknown origin and composition. In 1999, this stained soil was sampled to determine whether polychlorinated biphenyls (PCBs) were present.

Additionally, a 1997 passive soil gas survey showed evidence of 1,1,1-trichloroethane (1,1,1-TCA) in the subsurface. Given that traces (~1.5 parts per billion [ppb]) of 1,1,1-TCA had been detected in drinking water at a potentially downgradient location (the badging facility), the decision was made in 1999 to drill wells to assess whether radioactive and organic contamination was present in sedimentary interbeds beneath the OMRE and/or in the downgrade aquifer.

After the 1997 sampling was complete, photographs from several years in the early 1960s were discovered that showed ongoing liquid releases occurring from two facilities outside the OMRE Leach Pond. The radionuclide-contaminated soil in this location was previously assumed to be windblown and therefore, limited to the top few inches of soil. If the liquid releases had been contaminated, then the assumption that the contamination was surficial would probably have been in error. Further research led to "as-built" drawings showing that the releases had been coming from facilities that had been called (1) The Fuel Element Washing Facility, and (2) the Leaching Pit, both of which suggested that contamination could have been present in the liquid releases. The former locations and flowpaths of these facilities were assessed in 1999 to determine the nature and extent of contamination related to these

facilities. The historic photographs also showed a former transformer pad area, which was sampled in 2000 to determine whether PCBs that might change cleanup options were present in the soil.

The 1999 and 2000 characterization project was undertaken to fill data gaps left after the 1997 activities. The 1999 and 2000 activities included three major components.

1. The first major component included data collection from the surface soil above the basalt. During this activity, surface soils in and near the former OMRE leach pond, the fuel element washing facility, the leaching pit, and the associated ditches were field screened and sampled for radionuclides, organic compounds, and PCBs. Surface soil radiological results are described in Section J-1.2. Surface soil organic compound results, including PCB, are described in Section J-1.3. In addition, during coring activities the project geologist evaluated the surface soils, and this evaluation is included in Section J-1.4.

2. The second major component in Section J-1-5- included drilling coreholes into the basalt and both field screening and sampling the vadose zone, specifically within a 21-m (70-ft) interbed, for radionuclides and organic compounds.

3. The third major component in Section |J-1-6included drilling monitoring wells to the aquifer and sampling the groundwater for radionuclides and organic compounds.

J-1.2 Surface Soil Radiological Results

A combination of field screening and soil sampling with laboratory analytical techniques was used to characterize the OMRE soils for radionuclides. The results of these activities are discussed below.

J-1.2.1 Surface Soil Field Screening Results for Radiological Contamination

In conjunction with soil sampling and laboratory analyses, three field measurement systems were deployed at OMRE to help characterize the extent of gamma-emitting, radionuclide-contaminated surface soil. The first field measurement system, the global positioning radiometric scanner used an onboard computer that recorded global positioning and radiometric data. The global positioning radiometric scanner's radiation detection system, consisting of two plastic scintillation detectors, was used over a 6.4-hectare (15.8-acre) area to quantify and map the distribution of gamma-emitting radioactive contamination in the surface soils. The global positioning radiometric scanner survey was completed before other field work began. The map (Figure J-1) of the OMRE area, generated using data from the global positioning radiometric scanner, showed mostly Cs-137 in the top few inches of soil. The second field measurement system, an aboveground, tripod-mounted Ge spectrometer, made use of the global positioning radiometric scanner map by setting up in the areas identified as having elevated gamma-ray activity. The aboveground field measurement system used the U. S. Department of Energy Environmental Measurement Laboratory MI® software package for spectral analysis. The locations with elevated gamma-ray activity in the OMRE ditch were also targeted for corehole sampling (discussed in Section J-1.3.2) from the surface soil down to the soil/basalt interface. The third field measurement system, a downhole germanium (Ge) spectrometer, made use of these coreholes and other deeper holes drilled in the area to help assess the vertical extent of radionuclide-contaminated soil. The results of these aboveground and downhole in situ measurements are summarized in the following paragraph.

The global positioning radiometric scanner and the aboveground and the downhole in situ measurements have helped refine and confirm the OMRE conceptual model. The results show that a high percentage of the soil contamination (chiefly Cs-137) at OMRE is confined to the top two feet of soil,

except in the location of the former OMRE Leach Pond, where contamination is present at the soil/basal interface.

J-1.2.2 Surface Soil Sampling and Laboratory Results for Radionuclides

Soil samples were collected from biased locations and from random locations on a grid, as described in the Field Sampling Plan (FSP) (DOE-ID1999a). Two specific areas of concern were targeted. These were the global positioning radiometric scanner "hot spots" and the locations of a former fuel element washing facility and a leaching pit, which had been identified in historical drawings.

The results from the biased data collected from the fuel element washing facility and the leaching pit areas support eliminating these sites as sources. Although some surface radiological contamination was present in a number of samples, neither the biased sampling locations that were chosen to pinpoint the former locations of these facilities nor the random grid sample locations showed evidence of elevated contamination over what was detected in the general OMRE pond area, and little was detected at depth. If these facilities were sources of radionuclide-contaminated soil at one time, the soil has been disturbed, sampling missed the hot spots, or it was low level to begin with and has decayed. The only biased sample location that showed evidence of elevated contamination at the soil/basalt interface was located near the center of the former OMRE Leach Pond.

In addition to the liquid release area, the OMRE ditch was both field screened and sampled in 1999. Figure J-1, (the global positioning radiometric scanner map) shows the field screening results in which elevated gamma-rays were detected. The laboratory results from the ditch soil core samples show radiological contamination is present in these locations that exceeds the Risk Based Concentration (RBC) for Cs-137 (23 pCi/g) that was given in a January 3, 1996, Jeff Fromm (Idaho Department of Health and Welfare [IDHW]-Idaho Department of Environmental Quality [IDEQ]) letter for the 1E-06 100-year residential scenario. In general, uncontaminated soil surrounds these ditch hot spot locations, since from each of these "hot spots" shown on the map, soil corings were also collected down to the depth where basalt was reached. It is also apparent that the the hot spots appear to be less than two feet in diameter, the contamination is highest in the top foot of soil, and the Cs-137 concentrations are up to approximately 100± 8 pCi/g.

J-1.3 Surface Soil Organic Compound Results

A combination of field screening and soil sampling with laboratory analytical techniques was used to characterize the OMRE soils for organic compounds. In summary, every corehole drilled in the OMRE area in 1999 was field screened for organic vapor using an air pump and a photoacoustic analyzer (a.k.a., B&K). Additionally, soil in selected locations in the coreholes was sampled and sent to the laboratory for semivolatile organic compound (SVOC)/volatile organic compound (VOC) analyses. Also, grab samples of stained soil in the OMRE ditch and samples from a former transformer pad location were collected and sent for laboratory analysis. The following subsections discuss these results.

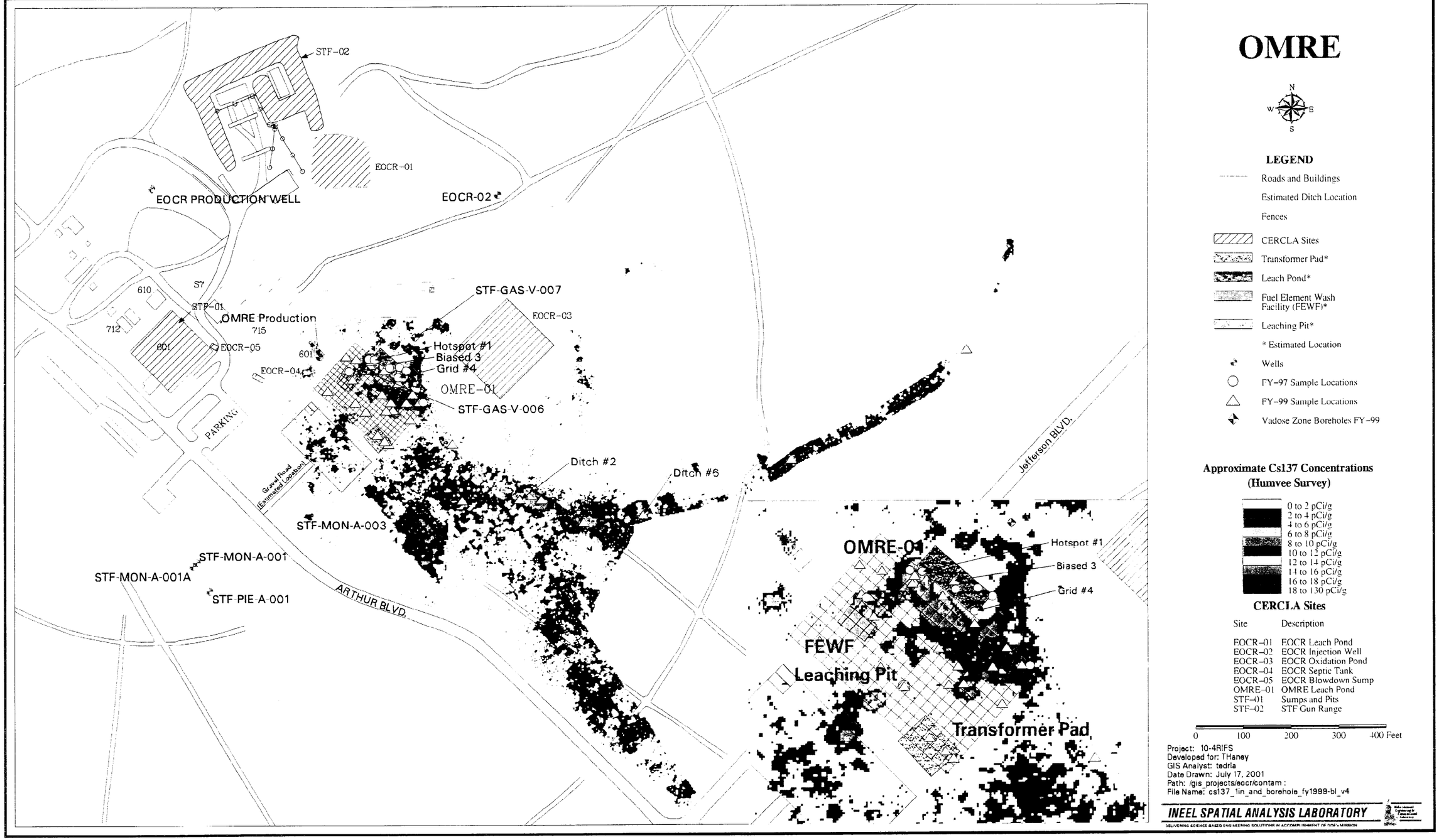

Figure J-1. OMRE area global positioning radiometric scanner survey map, CERCLA sites, and wells.

Table J-1. Summary of OMRE FY 1999 Radionuclide Soil Sample Results in pCi/g.

Isotope	Minimum (sample #, depth in ft)	Maximum (sample #, depth in ft)	Mean	Count[a]
Co-60	-0.06 ± 0.03 (OMV03001R4, 4.5–5)	4.2 ± 0.4 (OMS08201R4, 7.7–8.9)	0.09	6/95
Cs-137	-0.04 ± 0.03 (OMS01401R4, 6–6.5)	100 ± 8.3 (OMV00601R4, 0.25–0.75)	2.4	22/95
Pu-238	-0.02 ± 0.01 (OMS09001UP, 1-3)	0.05 ± 0.01 (OMS09001UP, 1–3)	0.003	1/95
Pu–239	-0.01 ± 0.003 (OMS09501UP, 1–2.8)	0.74 ± 0.07 (OMS04901UP, 0–1)	0.01	8/95
Sr-90	-0.11 ± 0.08 (OMS03601UP, 6.5–7.5)	37 ± 3.4 (OMV00601UP, 0–0.25)	1.0	26/95
U-234	0.75 ± 0.06 (OMS08602UP, 3–3.5)	1.6 ± 0.1 (OMV03001UP, 5-5.5)	0.94	95/95
U-238	0.68 ± 0.07 (OMS01401UP, 6–6.5)	1.39 ± 0.09 (OMV03001UP, 5–5.5)	0.94	95/95

a. Represents the number of true positives versus the number of analyses.

J-1.3.1 Surface Soil Organic Compound Field Screening Results

The photoacoustic analyzer was set to analyze for five different compounds: chloroform, 1,1,1-TCA, tetrachloroethylene (a.k.a., PERC), trichloroethene, and carbon tetrachloride. Blank samples were collected before and after each set of samples. The results from all the coreholes showed that none of the analyzed compounds were present in concentrations that were distinguishable from concentrations in the background blanks. Detection limits were approximately 1 part per million (ppm) for most compounds of interest.

J-1.3.2 Surface Soil Volatile Organic Compound Laboratory Results

None of the analyses completed on surface soil samples from the OMRE area showed the presence of VOCs, except for those completed on the stained soil samples collected from the ditch. Chrysene and aroclor-1254 were detected in these samples at concentrations of approximately 2.55 E+06 and 6.2 E+01 µg/kg, respectively. The detection of these compounds is consistent with the project geologists' opinion that the dark areas in the soil were degraded asphalt. Chrysene is a common polycyclic aromatic hydrocarbon (PAH) and aroclor is a PCB compound, both of which can be found in products such as creosote-treated wood, asphalt, or coal tar. The analyses on the stained soil required enough volume that the field team thought all the stained soil present at the site had been collected as samples.

J-1.3.3 Surface Soil Polychlorinated Biphenyl Results

As mentioned above, the stained soil in the ditch contained a PCB compound: aroclor-1254. Other than the stained soil in the ditch, which was sampled in 1999, the only location at OMRE that was sampled for PCB was a former transformer pad location. This sampling occurred in 2000. The results showed no evidence that PCB compounds are present in the soil in the former transformer pad location.

J-1.4 Surface Soil Geologic Results

During surface soil sampling, geologists evaluated the surface soil using the unified soil classification system. They found the soil consisted of an erratic mixture of graded silt, sand, and fine to medium gravel with a caliche (surficial case hardening by calcium carbonate) layer at approximately 9- 1.2 m (3-4 ft) below land surface (bls). The surficial deposit was dense and relatively uniform and was

typically assigned the classification symbol SW-GW. Color classification was uniform (10yr 4/3–10yr 6/3) throughout the Security Training Facility (STF)-OMRE area. Also, during surface soil investigations, construction debris such as wood was encountered in several locations. For the most part, the surficial unit was permeable and averaged seven ft in thickness in the STF-OMRE area. Within short distances, lenses of silt/sand mixtures were found on the surface. This material was classified as "loess" or wind blown silt.

J-1.5 Interbed Sediment Results

The sediments from a 21 m (70 ft) interbed in wells STF-MON-A-003, STF-V-GAS-006, and STF-V-GAS-007 were sampled to answer the basic question as to whether contamination was present or absent. The analyses on the sediments included gamma spectroscopy, Sr-90, uranium isotopes, and plutonium isotopes. A critical factor in the assumption that the interbed sediments would readily capture and hold contaminants was that they were high in clay content, as was reported in the drilling log for a previously drilled well adjacent to the OMRE site. However, the interbed consisted predominantly of dry, graded, silty arkosic sands with minor fine gravel. In other words, the interbed appears to be a typical fluvial sequence, not clay, and it is not likely to have detained any contaminants. The sands were subrounded to subangular quartz-feldspar rich with minor volcanic and ferromagnetic constituents. The color was a fairly uniform reddish brown (5yr 4/4–5yr 3/3), indicating possible oxidizing of the ferromagnetic constituents and baking from an overlying basalt unit. There was a problem with recovery in the core barrel during sampling due to lack of moisture within the interbed, but the volume was sufficient for the intended analyses.

J-1.5.1 Interbed Sediment Radiological Laboratory Results

Of the interbed sediments sent for analysis, no radionuclide contamination was detected, except for Sr-90 at approximately 1.11 ± 0.15 pCi/g in a sample collected from the 21-m (70-ft) interbed in the STF-V-GAS-007 corehole. The presence of Sr-90 in this sample could mean that radioactive contaminants reached the interbed, but because it occurred only in a single sample, this conclusion is speculative. For comparison, concentrations of Sr-90 in surface soil from fallout can typically reach 0.5 pCi/g. Concentrations of Sr-90 present in OMRE surface soil samples have been measured up to approximately 37 pCi/g.

J-1.5.2 Interbed Radiological Field Screening Results

In addition to sample collection and laboratory analysis, the coreholes were also field screened for gamma-emitting radionuclides with the downhole Ge spectrometer described in Section J-1.2.2. The detection limit of the system is generally less than 1 pCi/g for most gamma-emitters of interest. Note that this system will not detect Sr-90. The downhole Ge spectrometer showed low-level radionuclide-contaminated soil at the near surface (as described in Section J-1.1.1) and no elevated radioactivity deeper than the soil/basalt interface. Naturally occurring radionuclides were present in subsurface rock and soil in concentrations observed in regional soil.

Overall, the combination of laboratory and field screening data support the conclusion that a source of radioactive contamination is not present in the interbed from former OMRE activities that could serve as a long-term source of groundwater contamination. Figure J-2 shows the OMRE area, including existing well locations.

J-1.5.3 Interbed Sediment Organic Compound Laboratory Results

Sediments were collected from the 21-m (70-ft) interbed from wells, STF-MON-A-003, STF-V-GAS-006, and STF-V-GAS-007, and sent for SVOC/VOC analyses. The compounds xylene, ethylbenzene, and acetone were detected in interbed sediments collected from the 22.3-22.5 m (73.4-73.9-ft) and 23.9-24.2 m (78.7-79.6-ft) depths at location STF-MON-A-003 in maximum concentrations of 46, 15, and 44 µg/kg, respectively.

J-1.5.4 Interbed Organic Vapor Field Screening Results

During well construction, aquifer monitoring well, STF-MON-A-003, was fitted with vapor ports at the 21-m (70-ft) and 42-m (140-ft) interbeds, and at a rubble zone at 93 m (307 ft). The soil gas monitoring wells, STF-V-GAS-006 and STF-V-GAS-007 were fitted with vapor ports at the 21-m (70-ft) interbed. The photoacoustic analyzer was set to analyze for five different compounds: chloroform, 1,1,1-TCA, tetrachloroethylene (a.k.a., PERC), trichloroethene, and carbon tetrachloride. Field screening was completed during drilling in 1999 and again approximately five weeks after drilling was complete. No organic vapor was detected during these initial events. However, during the first round of the quarterly vapor port monitoring initiated in August of 2000, the compound 1,1,1-TCA was detected in soil gas pulled from the 21-m (70-ft) interbed at a maximum concentration of approximately 190 ppm.

J-1.5.5 Sedimentary Interbed Geotechnical Results

From three coreholes in the interbed, four samples were analyzed for moisture content and one sample was analyzed for particle size distribution. Two of the samples analyzed for moisture content, OMD00501GX 23.2–23.5 m (76.4–77.2 ft) and OMD00502GX 23.5–23.7 m (77.2–77.8 ft), were from different depths in the same well. The moisture content, 3.8% and 5.2%, respectively, points to a slightly moist formational condition indicating possible seasonal percolating fluid migration. This analysis is consistent with the lithologic log recorded in the field, in which slightly moist conditions were noted. In addition, it was recorded that water beaded up on the core barrel, but the sample appeared to be dry. Because of heat/pressure from drilling and assumed near 100% humidity in the corehole at that depth, condensation inside the core barrel could account for the laboratory moisture content analysis results. However, the collection method could also account for the moisture content of the samples: the samples were collected in lexan tubes, but had to be extracted from the core barrel by water pressure and not air pressure.

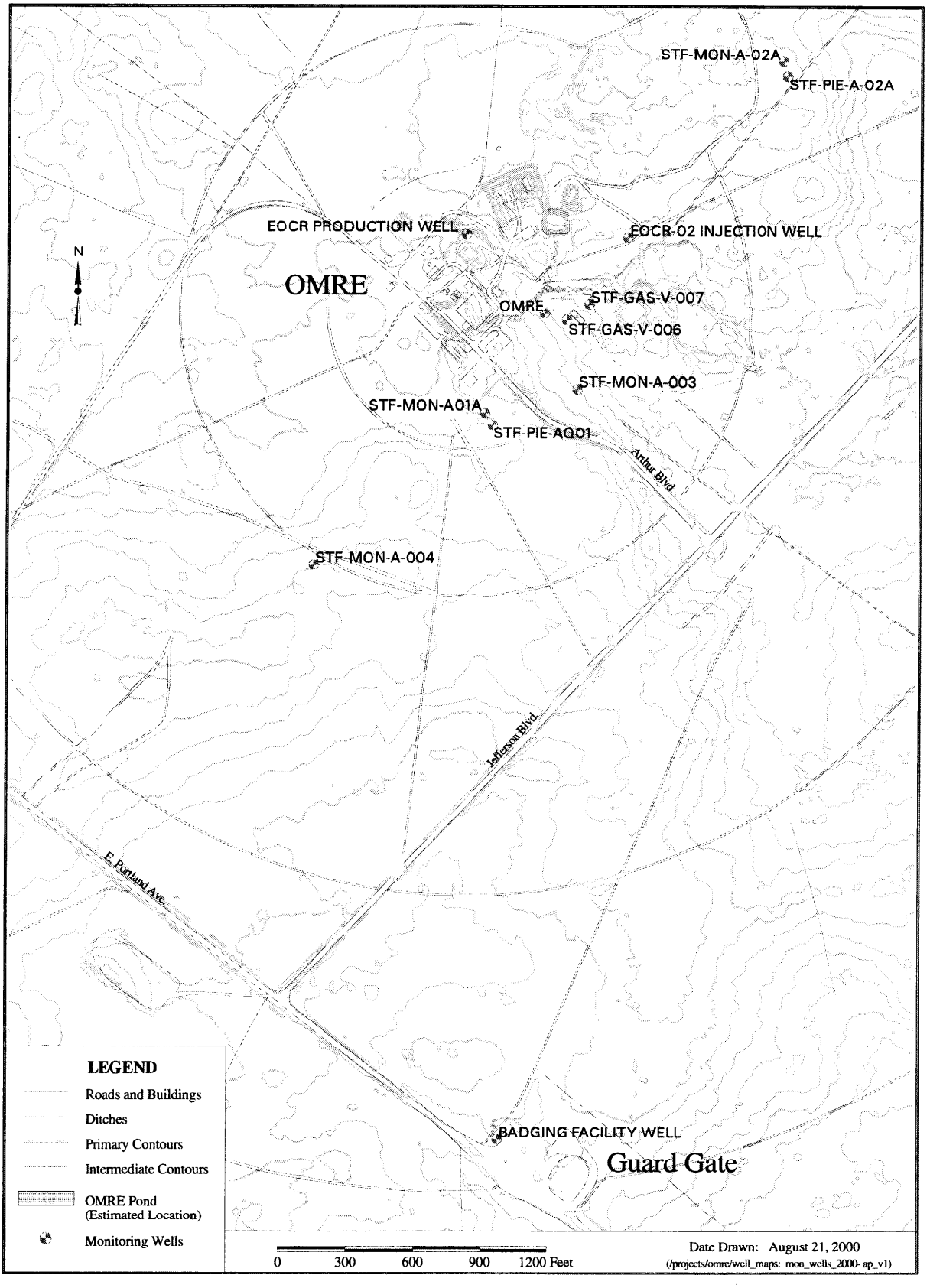

Figure J-2. OMRE area, including existing well locations.

The other two samples analyzed for moisture content, OMD00601GX (76.5–77.2 ft) and OMD00701GX 24.1–25.4 m (79.1–83.6 ft) were from different wells (STF-V-GAS-006 and STF-V-GAS-007, respectively), but close to one another. The moisture content, 7.5% and 6.2%, respectively, is consistent with and assumed to be under the same interpretation as the first two sample results.

One sample, OMD00701GX, also had a size distribution analysis test with data showing a sieve distribution of 77.7% fine sand with 13% fines or silt (exactly as recorded in the lithologic log) a fine grain, silty sand, reddish brown in color.

J-1.5.6 Sedimentary Interbed Perched Water Results

No perched water was encountered in any of the interbeds. Slight moisture was noted during drilling in the 21-m (70-ft) interbed at location STF-MON-A-003, but after allowing the well to sit over a three-day period, no water was detected either visually in drill cuttings or with an electronic-line (e-line).

J-1.6 Groundwater Results

J-1.6.1 Ground Water Organic Compound Laboratory Results

Samples were collected in 1999 from the Badging Facility Well (BFW), from United States Geological Survey (USGS) Well 107, and from two newly constructed wells, STF-MON-A-003 and STF-MON-A-004 for radionuclide and organic compound analysis. No radionuclides other than naturally occurring were detected. The compound 1,1,1-TCA was detected in samples collected from STF-MON-A-003 in concentrations of 1.7 and 1.8 µg/L. This same compound has been detected in similar concentrations in samples collected from the BFW, Waste Area Group (WAG) 4, and other wells across the Idaho National Engineering and Environmental Laboratory (INEEL). It is reported sporadically and at very low levels. These data are not likely to mean that the INEEL has multiple isolated 1,1,1-TCA plumes. Although the source is unknown, it is more likely that the 1,1,1-TCA detections are related to laboratory contamination or sampling equipment. No other organic compounds were detected in groundwater sampled in FY 1999.

Quarterly monitoring was initiated in 2000 from the following wells: the BFW, STF-MON-A-003, STF-MON-A-004, STF-MON-A-01A, and STF-MON-A-02A. Planned for a two-year duration, the first quarter of this monitoring resulted in nondetects for all compounds of interest.

J-1.6.2 Ground Water Radiological Laboratory Results

Samples were collected in 1999 from two existing wells, United States Geological Survey (USGS)-107 and the BFW, and from two newly constructed wells, STF-MON-A-003 and STF-MON-A-004, for gamma-spectroscopy, Sr-90, Pu-239/240, U-234/235/238, and tritium (H3) analyses. None of the samples contained positive activity at the 95% confidence level for any targeted gamma-emitting isotope (e.g., Cs-137 or Co-60). In addition, no statistically positive activity was detected in any sample for isotopic plutonium, H3, or Sr-90. The U-234 and U-238 results from each well were statistically positive at 95% confidence, while the U-235 results were flagged as nondetected or estimated quantities. The concentrations ranged from approximately 1.3 ± 0.12 to 2.1 ± 0.2 pCi/L for U-234 and from approximately 0.5 ± 0.06 to 0.8 ± 0.07 pCi/L for U-238. These uranium concentrations are typical of naturally occurring regional levels.

Quarterly monitoring was initiated in 2000 from the following wells: the BFW, STF-MON-A-003, STF-MON-A-004, STF-MON-A-01A, and STF-MON-A-02A. Planned for a two-year duration, the first quarter of this monitoring resulted in nondetects for all radionuclides of interest.

J-2. STF-02 GUN RANGE BACKGROUND AND DESCRIPTION

The Security Training Facility (STF)-02 gun range is located approximately 2.5 mi. east of the Central Facilities Area (CFA). The access route is from U.S. Highway 20 to Portland Avenue, then northeast on Jefferson Boulevard, and then west on Arthur Boulevard. The STF occupies facilities originally constructed to support the Experimental Organic Cooled Reactor (EOCR). STF-02 is located approximately 350 ft northeast of the STF-601 building.

The EOCR complex was converted to the STF in 1983, and served as a training center for the Idaho National Engineering and Environmental Laboratory (INEEL) security helicopters and Special Response Team (SRT). This conversion included the construction of a helicopter pad, rappelling tower, physical fitness course, STF-02 gun range and surrounding soil impact berms, STF-612 shooting house, and the STF-694 gas house. This site was used from 1983 until 1990 for security force practice maneuvers using small (<.50 caliber) weapons. STF-02 was placed on inactive status following an accident at the STF-612 building on January 1, 1990. The STF-02 site was identified in the fall of 1997 as a new Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site and included in the Operable Unit (OU) 10-04 Work Plan.

During the period of operation, it is estimated that 4 to 5 million small (<.50 caliber) ammunition rounds were fired into the soil impact berms and the walls of the STF-612 shooting house using various handguns, rifles, and shotguns. In addition, smoke bombs and practice grenades were discharged into the outlying training areas outside of the soil impact berms. The vast majority of the firing was done from the northern most asphalt pad and directed into the main berm through railroad tie target holders. The firing was generally limited to a section of the berm approximately 90-ft long and running parallel to the asphalt pad. The remaining target practice was done from inside the STF-612 shooting house. Firing was through the plywood walls and into the berms located outside the building. Two internal walls filled with sand and railroad ties were constructed within the plywood shed and shots were fired into these walls as well.

Potentially contaminated areas associated with this site include the five soil impact berms (three perimeter, two internal), the overflight (skip/impact) area outside the berms (near and far), soil inside the range and between berms in front of asphalt shooting pads, soil inside and outside the STF-612 shooting house, loose sand within the inner walls of STF-612, and creosote-treated railroad ties used for targets and for liners of the inner walls of STF-612 and the EOCR Leach Pond.

Fired and unfired projectile fragments and other ammunition debris have been found in outlying areas extending out to approximately 600 ft (187.5 m) from the northernmost soil impact berm and extending to approximately 50 ft (15.5 m) in the other three directions. Shell casings were routinely picked up by the SRT; however, some shell casings, shot gun shell casings, expended blank rounds, smoke bombs, and 40-mm projectiles from practice grenades are still present in the surface soil, as evidenced by recent site walk-throughs (Elliott 2000).

J-2.1.1 Environmental Setting

The STF-02 gun range site sits north of the original Organic Moderated Reactor Experiment (OMRE). The topography is generally flat, the surface soils are light brown and composed mainly of sand and silt. Below a depth of approximately 0.6-m (2-ft), the soil changes to dark brown with slight

moisture, but still contains mainly sand and silt. The soil impact berms are composed of similar material, but also contain a large quantity of gravel and rocks. The surface soil depths to basalt at the nearby OMRE are approximately 1–4 m (3–13 ft), and a sequence of basaltic lava flows and sedimentary interbeds underlies the STF area. The water table occurs at a depth of about 177 m (580 ft) below the surface (DOE-ID 1999a).

J-2.1.2 Contaminants of Potential Concern

No sample data existed for this site prior to this sampling project. Contaminants of potential concern included lead, copper, antimony, arsenic, zinc, mercury compounds, and other typical components associated with ammunition debris. Based on the estimated quantity of debris remaining in the soil, this site was thought to be above the residential future land use screening level for lead in soils (400 mg/kg). The railroad ties used for targets and inner walls of STF-612 were treated with coal tar creosote. Although the shell casings and other debris were routinely picked up and recycled after firing, site walk-throughs confirmed that some still remain at the site. A potential risk exists from live rounds remaining in the subsurface soil. No known remedial activities have taken place to date at STF-02. Surveys by a radiological control technician (RCT) indicated that no radiological contamination exists at the STF-02 gun range northeast of the EOCR building (Elliott 2000).

J-2.2 STF-02 Sample Collection and Analysis

Sampling activities included obtaining composite samples of the soils, sand, and railroad ties. A grid, used for random sampling design, was sized and positioned to envelop the soils subgroups. A composite sample consists of three to five subsamples from each sample location/grid. Surface 0–15 cm (0–6-in.) samples were collected from the soils and asphalt pad subgroups, and subsurface 15–45 cm (6–18-in.) samples were collected from the berms. While the majority of the lead fragments were believed to be located within the 3 cm (0–12-in.) depth range, samples were collected to a depth of 45 cm (18 in.) in an attempt to measure contaminant migration. It was believed that the lead and other metals are bound up in the soil lattice and have not leached or migrated below this depth. Composite samples from biased locations were collected from four target positions (located in the impact area directly behind target posts) on the main berm, and from the internal portions of the remaining berms. Subsamples were collected from predetermined location(s) and composited in a stainless steel or aluminum pan. Samples were collected from sieved media to identify and quantify the concentration of lead and other heavy metals (seiving was performed in the field). The lead and other metal solids removed from the sample media were weighed and the information was recorded. For large areas where variability was expected, nine or ten samples were collected. On smaller areas with less variability, four or more samples were collected. For areas where the threshold was expected to be far below concentrations, two or more samples were collected (Elliott 2000).

J-2.2.1 Main Berm (#2)

Composite samples were collected from the main berm (Berm 2). Samples were collected from biased locations (areas .6 m [2 ft] wide and 1.5 m [5 ft] high) directly behind four target posts, and consisted of one sample per each stratum—one from the top 15 cm (6 in.) and one from a depth of 15–45 cm (6–18 in.). Samples were also collected from two randomly selected locations and consisted of one sample per each stratum—one from the top 15 cm (6 in.) and one from a depth of 15–45 cm (6–18 in.). The soil was removed using a large spoon, taking care to reduce soil sloughing. Each sample was collected from the sieved soil after the lead/metal fragments were removed. The lead/metal fragments removed were weighed and the information recorded.

J-2.2.2 Perimeter and Internal Berms

Composite samples were collected from the internal faces of Berms 1, 3, 4, and 5. Specific sample locations were randomly selected from each berm. Soil was collected from the first 15 cm (6 in.) and from a depth of 15–45 cm (6–18 in.). The soil was removed using a large spoon, taking care to reduce surface soil sloughing. Two samples were collected from each location. Two duplicate samples were collected from this subgroup. Each sample was collected from the sieved soil after the lead and other metal fragments were removed. The lead/metal fragments removed were weighed and the information was recorded.

J-2.2.3 Overflight (Impact/Kick-out) Area

Composite samples were collected from the overflight (impact/kick-out) area beyond the north berm. This area was broken into two individual sections. Soil was collected from the surface to a depth of 15 cm (6 in.), using a large metal sampling spoon, and mixed in a stainless steel/aluminum pan. A total of 11 composite samples was collected from each area. Each sample was collected from sieved soil after the lead/metal fragments were removed. The lead/metal fragments removed were weighed and the information was recorded.

J-2.2.4 Soil Inside Range and Between Berms

Composite samples were collected from the soil inside the range and between the berms. Soil was collected from the surface to a depth of 15 cm (6 in.) and composited in a stainless steel/aluminum pan. Each sample was collected using a large metal sampling spoon from each location. Each sample was collected from sieved soil after the lead and other metal fragments were removed. The lead/metal fragments removed were weighed and the information was recorded.

J-2.2.5 Soil Inside and Outside the STF-612 Shooting House

Composite samples were collected from the soil inside and outside the shooting house. Soil was collected from the surface to a depth of 15 cm (6 in.) and composited in a stainless steel/aluminum pan. Each sample was collected using a large metal sampling spoon from each location. Each sample was collected from sieved soil after the lead and other metal fragments were removed. The lead/metal fragments removed were weighed and the information was recorded.

J-2.2.6 Sand Inside STF-612 Shooting House

Composite samples were collected from the sand inside the shooting house. Sand on the floor and inside the walls were collected and composited in a stainless steel/aluminum pan. Each sample was collected using a large metal sampling spoon from each randomly selected location. Each sample was collected from sieved sand after the lead and other metal fragments were removed. The lead/metal fragments removed were weighed and the information was recorded.

J-2.2.7 Railroad Ties

Composite samples were collected from the railroad ties (those inside the shooting house walls and those used as target holders). Fragments of the railroad ties were collected and mixed in a stainless steel/aluminum pan. Samples were collected using a hand auger and coring tool from each randomly selected location. Each sample was collected from sieved wood after the lead and other metal fragments were removed. The lead/metal fragments removed were weighed and the information was recorded.

J-2.2.8 EOCR Leach Pond

Composite samples will be collected from biased locations inside the leach pond. Soil was collected from the surface to a depth of 15 cm (6 in.) and composited in a stainless steel/aluminum pan. One sample was collected from each location using a large metal sampling spoon. Each sample was collected from sieved soil after the lead and other metal fragments were removed. The lead/metal fragments removed were weighed and the information was recorded.

J-2.2.9 Sampling Results

The results confirmed that the highest lead concentrations were present in the Main Berm (#2) and were located in the top 15 cm (6 in.) of soil. Elevated concentrations for copper, selenium, and thallium were observed in most samples as well as lead. All other concentrations were below or close to background INEEL concentrations estimated in Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclides Concentrations for the Idaho National Engineering and Environmental Laboratory (Rood 1996). Elevated concentrations were observed for the aforementioned contaminants at the 45-cm (18-in.) level, but to a lesser degree suggesting that leaching to the deeper depths is not as severe as at the 0–15-cm (0–6-in.) depth.

J-3. BOILING WATER REACTOR EXPERIMENT SITES

J-3.1.1 Site Background and Description

The Boiling Water Reactor Experiment (BORAX) area consists of several sites associated with the experimental boiling water reactors operated by Argonne National Laboratory (ANL) during 1953–1964. The sites of concern retained for the Operable Unit (OU) 10-04 Ecological Risk Assessment (ERA) are as follows:

1. BORAX-01 BORAX III through V leach pond
2. BORAX-02 BORAX I burial site
3. BORAX-04 BORAX trash dump
4. BORAX-08 BORAX ditch
5. BORAX-09 BORAX II, III, IV, and V Reactor facilities.

3.1.1.1 BORAX-01. BORAX-01 is the former site of a leach pond associated with the BORAX III through V experiments initiated by ANL. The site is located approximately 1.2 km (0.8 mi.) north of Experimental Breeder Reactor (EBR)-1. Experiments were conducted at the site between 1953 and 1964 to investigate the interaction among various components of the reactor/power-generation train. The BORAX leach pond was constructed to receive liquid effluent generated during the reactor tests. The pond received effluent associated with BORAX III through V. No liquids were discharged to the pond from the BORAX I or II testing. Prior to decontamination and dismantlement (D&D) actions in 1984 and again in 1991 through 1992, soil samples showed that Cs-137, Co-60, U-234, U-235, U-238, and Pu-239/240 levels were above background. The contaminated soil was left in place and backfilled with clean soil, graded, and revegetated. During subsequent D&D operations, a small amount of contaminated soil, and process piping were removed.

3.1.1.2 BORAX-02. OU 6-01 is identified as BORAX-02 in the Federal Facility Agreement and Consent Order (FFA/CO). This site is the location of the first of five boiling water reactor experiments and is therefore known as BORAX I. BORAX-02 is located about 832 m (2,730 ft) northwest of the EBR-I reactor building, EBR-601. The BORAX-02 site includes a 61 × 128-m (200 × 420-ft) surface-soil contamination area surrounding the 30 × 30-m (100 × 100-ft) fenced burial ground where the intentional destruction and subsequent burial of the reactor occurred in 1954. The volume of buried radionuclide-contaminated soil and debris is approximately 179 m^3 (6,336 ft^3). The 7,804-m^2 (84,000-ft^2) area was covered with 15 cm (6 in.) of gravel in 1954, but grass, sagebrush, and other plants have since reseeded the area. The BORAX-02 site was evaluated in the remedial investigation/feasibility study (RI/FS) for OUs 5-05 and 6-01 (INEL 1995). A Record of Decision (ROD) for this site was signed in December 1995 and included a selected remedy (INEL 1996). The selected remedial action for the burial ground specified containment by capping with an engineered long-term barrier comprising primarily natural materials. The fenced burial site is covered with an engineered cap covered with large boulders.

The OU 5-05/6-01 RI/FS (INEL 1995) evaluated human health risks for BORAX-02 without evaluating other release sites in the BORAX facility. As a result, the cumulative risk from all of the BORAX release sites has not been evaluated. Additionally, the remedy that was selected for the site (capping) has not been completely evaluated for its protection of ecological receptors, and a small area of Cs-137 contamination located outside of the southeastern edge of the cap was identified by site surveys conducted in 1998.

3.1.1.3 BORAX-04. The BORAX-04 trash dump is located 137 m (450 ft) from the northwest corner of the BORAX V fence and is the former location of a trash dumping area used during construction, operation, and demolition of BORAX facilities prior to 1964. BORAX-04 was the subject of a Track 1 investigation. Evidence indicates that all waste material was removed, and the area was filled in with clean soil, graded, and reseeded. BORAX-04 is classified as a "No Action" site in the administrative record.

The site was used as early as 1953 and abandoned in 1964 when operations at the BORAX facilities ceased. The D&D occurred in 1985, and approximately 245 m^3 (320 yd^3) of waste was removed, 90% of which was thought to be asbestos-contaminated materials. As part of the Track 1 decision document (DOE-ID 1994), a risk evaluation was performed to determine the risk-based soil concentrations for the site's contaminants. Based on 1988 sampling results, levels of barium, cadmium, and mercury were well below the risk-based concentration limits. Cyanide was slightly above the human health risk-based concentration limit, but well within the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP) target risk range. Repeated radiological surveys showed no evidence of contamination. The Environmental Protection Agency (EPA), the Department of Energy (DOE), and the Idaho Department of Health and Welfare—Idaho Department of Environmental Quality (IDHW-IDEQ) project managers signed the Track 1 decision document proposing that "No Further Action" should be conducted at the site because residual contaminant levels were low. Since no confirmation sampling was performed postremediation, this site will be evaluated for ecological risk in the OU 10-04 ERA.

3.1.1.4 BORAX-08. BORAX-08, otherwise known as the BORAX Ditch, was the site of a radionuclide-contaminated drainage ditch associated with the BORAX II through V reactor program. The BORAX Ditch was an unlined, radiologically-controlled area beginning approximately 12 m (40 ft) north of the former BORAX II through V facilities. The ditch measures approximately 477 m (1,565 ft) in length and 15 m (50 ft) in width at its widest point. A 10-cm (4-in.) raw-water line led from the reactor to a 23-cm (9-in.) corrugated underground metal pipe that emptied into the ditch just outside the north security fence of the BORAX II through V facility. When radiological surveys indicated that the ditch contained radionuclide contamination up to 1,900 counts per minute (cpm), presumably from BORAX II

through V reactor waste stream effluent, the BORAX ditch was fenced and posted as a soil contamination area.

Contamination in the BORAX ditch was characterized during the Phase II sampling for OU 10-06 from April through June 1994. Soils were sampled for radionuclides and for metals contamination. A risk evaluation showed that risks and hazard quotients for the detected metals (except for arsenic) were below the NCP target risk range. The concentration term for the arsenic was only 3 mg/kg greater than background levels. Radionuclides contained in the site's soils were shown to pose a potential threat to human health and the environment.

A nontime-critical removal action (NTCRA) was conducted at the site between September 12 and October 13, 1995 (Phase III of OU 10-06) to reduce risks to acceptable levels. Radionuclide-contaminated soils were excavated and transported to the Test Reactor Area (TRA) Warm Waste Ponds (WWP) for interim storage, pending a final decision. After excavation was complete, verification sampling and laboratory analyses were conducted to assess the residual radionuclide content. The highest level of Cs-137 observed in the postremediation verification samples collected at the site was 3.0 ± 0.2 pCi/g. This concentration was lower than the human health soil preliminary remediation goal (PRG) for Cs-137 (16.7 pCi/g). After the removal action, the BORAX ditch area was either backfilled or graded flat, then reseeded with native flora.

3.1.1.5 BORAX-09. BORAX-09 is the reactor building for BORAX II through V. A D&D action was conducted at BORAX-09 in 1996 to remove and contain Resource Conservation and Recovery Act (RCRA) hazardous materials and to leave the site in a safe and stable condition until a final assessment could be made in the OU 10-04 RI/FS (Rodman 1997).

The BORAX-09 comprises belowground structures remaining from Argonne Experimental Facility (AEF)-601, which include subfloor concrete foundations, reactor components, and other remaining artifacts of the BORAX V facility. The site is approximately 0.4 ha (0.9 acre), fenced with chain-link and barbed wire and posted as a radiation area to restrict entry. Underground items left at the site include two reactor vessels, a water storage pit (now dry), an equipment pit, a subreactor room, a utility pipe trench, a steam pipe trench, and a dry storage pit.

Analysis of subreactor room floor liquids in 1991 showed 73 ± 9 pCi/L of Cs-137 contamination. Follow-up samples collected later in 1991 showed no gamma-emitting radionuclides and gross alpha and beta activity were below detection limits. Various facility systems contain fixed, loose, and friable asbestos-containing material. Other contaminants associated with the site include lead and cadmium, identified in 1992, presumably from lead-based paints containing cadmium pigment. Mercury, Co-60, and Cs-137 were also found in sump samples.

The D&D activities on the remaining reactor building systems and removal of the remaining external support systems began in April 1996 and were completed in May 1997. All remaining aboveground structures and systems were removed, and the subfloor levels of the reactor building were entombed. Below grade pits and trenches were backfilled with soil, and the concrete shield blocks were replaced over these areas. The remaining reactor building systems, including two reactor vessels and other asbestos-containing materials were buried in the below grade concrete structure. The top 1.2-m (4-ft) portion of the reactor pit was filled with clean fill material and the shield blocks were replaced.

In addition to Cs-137 and Co-60, radiochemical analysis indicated that the levels of Sr-90 contained in the soil were close to background levels. Total alpha spectrometric analyses of selected soil samples indicated that alpha-emitting radionuclides detected were consistent with expected Idaho National Engineering and Environmental Laboratory (INEEL) background activities.

The reactor building foundation will continue to be covered with a herculite tarp to minimize intrusion and exposure to potential receptors until the final assessment is conducted in the OU 10-04 RI/FS. The chain-link perimeter fence surrounding the reactor building was left in place. An area of about 1.2 ha (3 acres) was contoured to match the surrounding areas, then reseeded with native grasses to comply with the storm water pollution prevention plan for this site (INEEL 1996).

J-3.1.2 Environmental Setting

The overall size of the BORAX area approaches 30 acres (12 ha) and is generally flat. The terrain gradually slopes downward in the direction of the trash dump and ditch. Vegetation consists predominantly of sagebrush (*Artemisia spp*), rabbitbrush (*Chrysothamnus spp*), and crested wheatgrass (*Agropyron cristatum*), with lesser amounts of other grasses and forbs. The area surrounding the remaining site structures provides relatively continuous stretches of good sagebrush habitat. Access to the site off VanBuren Boulevard is via dirt and gravel roads. All of the permanent structures have since been dismantled, removed, or buried in place. Chain link and barbed wire fences surround BORAX-02 and BORAX–09. Site visits indicated that small mammals seek shelter under the riprap boulders placed on top of BORAX-02. Evidence of small mammal activity was also observed along the fence surrounding BORAX-09. Many small and large mammal tracks and scat were also observed.

J-3.1.3 Contaminants of Potential Concern

The BORAX sites (-01, -02, -04, -08, and -09,) were identified as sites of potential risk to ecological receptors from both metals and radionuclide contamination, based on the results of the preliminary evaluation for the WAGs 6 and 10 Ecological Risk Assessment. Previous sampling at the BORAX site was restricted primarily to radionuclides with some limited metals. The presence or absence of other inorganics (or organics) above background levels has not been firmly established. Since process knowledge indicates little potential for the presence of organic constituents at the BORAX site, the sampling for ERA was limited to metals and radionuclides.

3.1.3.1 Transect Sampling Design. Five 45-m (147-ft) length transects were placed at selected locations. Actual locations were determined based on judgement as to locations of co-located vegetation, as well as preferred trap locations. Small mammal traps were set at approximately 5-m (1.5 ft) intervals along the transect. Trap lines were moved and more traps were added to the transects to collect the required samples when the original transect locations failed to produce enough small mammals for a complete sample. Samples collected at each transect or cottontail trap location included:

- One surface 0–15 cm (0–6 in.) and one subsurface soil 15 cm up to 60 cm (6 in. up to 24 in.)
- One sagebrush composite vegetation tissue
- One deer mouse composite terrestrial animal tissue
- One Ord's kangaroo rat composite terrestrial animal tissue
- One cottontail per trap location terrestrial animal tissue.

3.1.3.2 Vegetation. Wyoming big sagebrush (Artemisia tridentata spp wyomingensis) were collected for chemical analysis to represent functional plant types (e.g., shrubs, grasses, and forbs). Sagebrush represents the shrub most commonly used by INEEL primary consumers, including the pronghorn, sage grouse, black-tailed jackrabbit, Nuttall's cottontail, and the pygmy rabbit. In addition,

sagebrush is an important component in the diets of avian and mammalian omnivores and herbivorous insects.

The transect line provided the focus from which sampling locations were established. Vegetation was collected from a maximum of four subsamples (individual plants) at intervals along the transect lines. The sampling of the vegetation included harvesting leaves, small stems, and inflorescences. The intent was to gather plant material that is most likely to be browsed by herbiovores.

3.1.3.3 Soil. Five samples were collected at the surface (0–6 in.) and five samples were collected from the subsurface 15–cm 60 (6–24 in.). Each sample consisted of four increments collected at proximal locations along the designated transects. Samples consisted of composites from locations within the sampling transects that correspond to plants from which vegetation samples were collected. The depths were chosen to anticipate the depth most likely to pose a source of contamination to plant roots, and ingestion/physical exposures for surface dwelling and burrowing animals. All soil sampling was conducted using stainless steel augers, stainless steel scoops, spoons or trowels previously decontaminated. The surface at the point of soil collection was cleared of debris prior to sampling, so that only soil material was collected. Subsamples were obtained proximal to sampled vegetation. The samples were thoroughly homogenized prior to bottling to ensure that representative samples were collected.

3.1.3.4 ***Terrestrial Animals.*** Three small mammal species representing the major linkages between primary and secondary consumers and higher predators were collected for tissue analyses:

- Deer mouse (*Peromyscus maniculatus*)
- Ord's kangaroo rat (*Dipodomys ordii*)
- Nuttall's cottontail (*Sylvilagus nutallii*).

The deer mouse is the primary prey item for both secondary and tertiary consumers. Because it is omnivorous, widespread, and relatively easy to collect, this species is commonly used to represent several important linkages in the food chain and is the primary choice. Like the deer mouse, the kangaroo rat is a common prey item for both secondary and tertiary consumers. It is omnivorous, widespread, and relatively easy to collect. The kangaroo rat is used to represent several important linkages in the food chain. Cottontail sign was commonly seen at the fence line and areas surrounding the BORAX-02 cap. This species will provide an indication of the exposure of burrowing animals to buried contaminants at the site.

Deer mice and kangaroo rats from transect traps were composited to obtain required tissue amounts. Compositing did not include segregation of small mammals by sex or age, but was limited to the single species. Small mammal species, other than deer mice, kangaroo rats, or Nuttall's cottontail, caught in the traps were weighed and documented in the field logbook and released.

All small mammal tissue was analyzed as whole body and no individual organ analysis was conducted. The samples were not washed prior to homogenization. The intent of this sample preparation was to evaluate what a predator is most likely to consume. By incorporating all unwashed, biotic tissue, all available contaminants in each sample were assessed; however, not all of the analytes were necessarily bioavailable.

An animal, sacrificed for contaminant analysis, was dispatched by placing the animal in a plastic bag and asphyxiating it with CO_2. After dispatch, each carcass was weighed and placed within another clean plastic bag for storage in the freezer until enough sample was collected for analysis.

J-3.1.4 Sampling Results

Results are not available at this time. Results will be evaluated upon receipt of results from labs.

J-4. FLY ASH PIT (CPP-66)

J-4.1.1 Site Background and Description

Chemical Processing Plant (CPP)-66 is the site of a pit used for disposal of ash generated by the Idaho Nuclear Technology and Engineering Center (INTEC) Coal-Fired Steam Generation Facility (CFSGF), designated CPP-687. The CFSGF complex is a 228-m × 137-m (750-ft × 450-ft) enclosure containing several buildings located southeast of the main INTEC security fence. Since 1984, the CFSGF has been generating about 1016 tonnes (1,000 tons) of ash per year. This ash is hydrated and placed into CPP-66, located due east of CFSGF. CPP-66 is approximately 243 m × 121 m × 3.3 m (800 ft × 400 ft × 11) ft in size. The original ash pit built in 1984 had a capacity of 64,008 m^3 (70,000 yd^3), in 1991 it was enlarged to a total volume of 109,728 m^3 (120,000 yd^3).

Limestone is added to the coal prior to burning to reduce subsequent emissions of sulfur oxides and to control bed depth in a process called atmospheric fluidized bed combustion. The process residue (ash), consisting of fly ash, bottom ash, calcium carbonate, and calcium sulfate, is mixed with water inside a cement mixing truck to produce a slurry, hauled to the ash pit, and dumped into the pit behind a three-ft dike and allowed to dry.

The ash produced in this process contains measurable quantities of radionuclides and metals originally present in the coal and/or limestone. In the past, waste pit ash was analyzed for U-238, Th-232, and K-40, as well as for inorganic constituents. Concentrations of U-235 were estimated from its normal concentration relative to U-238. Inorganics of potential concern include beryllium, boron, chromium, fluoride, molybdenum, silver, strontium, and tin (DOE-ID 1993).

A 1998 study involving reutilization of fly ash from the CFGSF predicted that CPP-66 would be completely filled in less than a year at its rate of use (Langenwalter et al. 1998). Consequently, the CFSGF was put on restricted use and was scheduled for standby operation on October 1, 1999, until a decision is reached by the regulatory agencies on whether to continue operations at the facility. The CFGSF is not operational at the time of this publication.

Results of analyses from 1985–1989 indicated that the majority of hazardous substances that were analyzed for in the slurry were at concentrations below Idaho National Engineering and Environmental Laboratory (INEEL) surface soil background concentrations, as characterized in Appendix F of the Track 1 guidance document (DOE-ID 1992). Only Th-232 and chromium are present in the waste ash above known INEEL background and both only slightly exceed background concentrations.

The site was evaluated in the Waste Area Group (WAG) 3 Ecological Risk Assessment (ERA) for risk to ecological receptors from metals and radionuclides in the fly ash slurry. The assessment was performed using the results of a previously conducted screening level ecological risk assessment and the same basic methodology developed in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et al. 1995). The WAG 3 ERA in the Operable Unit (OU) 3-12

Record of Decision (ROD) found CPP-66 to have hazard quotients (HQs) greater than 1.0 from estimated concentrations of boron, fluoride, selenium, and strontium.

The OU 3-13 Final ROD (DOE-ID 1999b) states that "CPP (Steam Fly Ash Pits) presents only a potential ecological risk and will be addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) OU 10-04, which focuses on INEEL-wide ecological risk concerns."

J-4.1.2 Environmental Setting

The fly ash pit is approximately seven acres in size and surrounded by a berm. The bermed area is about 3–3.6 m (10–12 ft) above the natural terrain and is composed of gravel and loosely compacted soil. Rabbitbrush (*Chrysothamnus spp*) and crested wheatgrass (*Agropyron cristatum*) comprise the dominant vegetation on the berm. The area surrounding the bermed pit is composed mainly of rabbitbrush, and to a lesser extent with sagebrush (*Artemisia spp*), cheatgrass (*Bromus tectorum*), and other weedy species (e.g., Russian thistle). Large and apparently productive rabbitbrush shrubs were observed growing directly on the consolidated fly ash at the southeast side of the pit. Other areas of the fly ash pit other than the berm were void of vegetation. The area around the ash pit is generally disturbed and surrounded by a dirt/gravel road. A railroad spur that runs parallel to the pit is located to the north. An asphalt road (East Perimeter Road) bounds the western side of the pit area.

A site reconnaissance in November 1999 identified the presence of many burrowing mammals, both on the berm, as well as in the surrounding area. An unidentified species of small bird was seen to be ingesting what appeared to be unconsolidated fly ash on the berm area.

J-4.1.3 Contaminants of Potential Concern

The fly ash pit was evaluated in the WAG 3 ERA for risk to ecological receptors from metals and radionuclides in the fly ash slurry. The assessment was performed using the results of a previously conducted screening level ecological risk assessment and the same basic methodology developed in the *Guidance Manual for conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et al. 1995). The WAG 3 ERA in the OU 3-12 ROD found CPP-66 to have hazard quotients (HQs) greater than 1.0 from estimated concentrations of boron, fluoride, selenium, and strontium.

Results of analyses from 1985–1989 indicated that the majority of hazardous substances that were analyzed in the slurry were at concentrations below INEEL surface soil background concentrations, as characterized in Appendix F of the Track 1 guidance document (DOE-ID 1992). Only Th-232 and chromium are present in the waste ash above known INEEL background, and both only slightly exceed background concentrations.

A larger group of metals then identified by the WAG 3 ERA were sampled for at this time for two reasons. The additional metals were identified as risk drivers for ecological risk assessments at other WAGs at the INEEL, and they are potential by-products of the incineration process. The Track I for this site (DOE-ID 1993) identified beryllium, boron, chromium, fluoride, molybdenum, silver, strontium, and tin as inorganics of potential concern in the fly ash process. Mercury and lead are also common ecological concerns. Cadmium, antimony, and copper have been shown to be problematic at other locations. The previous sampling results were compared to the Track 1 background values (DOE-ID 1992) and not the newer and often more conservative values (Rood et al. 1996). Radionuclides found in the concentrations of fly ash, in general, do not produce unacceptable ecological risks. Therefore, radionuclides are not considered contaminants of potential concern and were not sampled for on this project.

J-4.1.4 Transect Sampling Design

Five 45-m (147 ft) length transects were placed at selected locations. Five samples were collected at the surface 0–15 cm (0–6 in.) and five samples were collected from the subsurface 15–60 cm (6–24 in.). Each sample consisted of four increments collected at proximal locations along the designated transects. Samples consisted of composites from locations within the sampling transects. All soil sampling was conducted using stainless steel augers, stainless steel scoops, spoons or trowels previously decontaminated. The surface at the point of soil collection was cleared of debris prior to sampling, so that only soil material was collected. The samples were thoroughly homogenized prior to bottling to ensure that representative samples were collected.

J-4.1.5 Sampling Results

All inorganic results at the Fly Ash Pit were either below detectable limits or within typical INEEL soil background concentrations estimated in Rood et al. 1996.

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